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ABSTRACT

This instructor's guide is designed for use with an accompanying 10-book series containing core instructional materials that deal with subject matter needed by apprentices during the first or second years of apprenticeship-related subjects training. Discussed first are the nature and organization of apprenticeship programs in general. The content and importance of related-subjects instruction are outlined. Examined in the next section is the role of instructors in addressing the following needs of adult learners: the need to be comfortable with a learning situation; the need for ownership of information and skills; and the need for explicit, concrete information. The final two sections consist of brief descriptions of both the core curriculum materials provided in the booklets as well as additional resources for use in related subjects instructional programs. (MN)

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A BASIC CORE CURRICULUM

Instructor's Guide To
Apprentice Related Training Modules

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1. General Nature and Organization of Apprenticeship

What Is Apprenticeship?

Apprenticeship is a unique, voluntary training system through which individuals acquire trade and craft skills and knowledge. Training combines daily on the job instruction in manipulative skills with periodic classroom instruction in technical subjects related to work requirements. The training design provides for learning all required *practical* and *theoretical* skills and knowledges for the chosen skilled occupation. Practical aspects of work are mastered on the job as apprentices are rotated through all phases of their particular occupations. Theoretical aspects of work are mastered during related subjects instruction in the classroom. Related instruction continues throughout the apprenticeship term and provides an opportunity to consider, in depth, the underlying principles of job activities. This arrangement of on the job and classroom instruction is a standard part of typical apprenticeship indenturing agreements. It ensures the individual's employability and guarantees competent workers for industry by providing for learning the complete range of skills and knowledge during training.

The training system has requirements about the time period for apprentice training, pay, and performance expectations. For example, the required length of time for training generally ranges from one to six years, depending upon the specific trade. The majority of programs require three to four years of work and study to complete an apprenticeship. Since apprentices are full-time employees of the company in which they are apprenticed, the system includes a pay schedule for apprentices while they train. Usually the wage scale begins at about half of a journeyman's rate and increases progressively with satisfactory completion of work assignments and training segments. Near the end of the apprenticeship term, pay ranges from 90 to 95 percent of the full journeyman rate. The system also requires a formal written agreement between the apprentice and the program sponsor in which is set forth expectations, duties and obligations of each party for the apprenticeship term. Among items typically incorporated into the agreement are provisions for related instruction, overtime regulations, minimum wage schedules for each period in the apprenticeship term, and approximate time schedules for training in different aspects of the occupation.

Why Is Apprenticeship Important?

For centuries apprenticeship has been a preferred method of training. Thousands of workers have been trained to perform effectively in high-skill and technical occupations to the advantage of both the individuals and program sponsors. For the apprentice the advantages for participating in the training system include the following:

1. Gaining varied skills through instruction and experience in all major aspects of a trade or craft;

2. Learning to work in harmony with different types of trades and crafts people in a work setting;
3. Learning to work within a company or work organization;
4. Learning about each skilled worker's part in the productivity plan of the industry and/or business;
5. Receiving a wage with regular increases while learning a skilled craft or trade;
6. Increasing employability and economic security; and
7. Receiving recognition as skilled workers from peers, journeymen, employers and union members.

For the program sponsor, the advantages for participating in the apprenticeship training system include the following:

1. Developing and ensuring a supply of trained, skilled and knowledgeable workers and supervisors for their operations;
2. Increasing worker productivity, overall skill levels and versatility;
3. Lessening the need for supervision of employees by developing initiative, pride in craftsmanship, speed and accuracy in work; and
4. Continuing to attract a constant flow of capable men and women into the trade or craft.

Which Occupations Are Apprenticeable:

Apprenticeship is a training system for learning any of the more than 700 apprenticeable trades or crafts. Included in the system are occupations such as machinist, plumber, fire medic, x-ray technician, die maker, water treatment plant operator, electrician, millwright and printer. Apprenticeable occupations generally are defined by the following:

a. Skills are learned primarily through a combination of on-the-job training supplemented by related technical instruction.
b. Training requires at least 2,000 hours of work experience plus related instruction.
c. The occupation involves manual, mechanical or technical skills and is practiced industry-wide as a recognizable trade or craft.
d. Training for the occupation involves the development of a body of skills sufficiently well defined to be applicable throughout an industry.
e. The occupation does not primarily involve only selling, managerial, clerical or professional activities.

Who Is Involved With Apprenticeship Programs?

The two parties most intimately involved with apprenticeship programs are individual apprentices and program sponsors. Apprentices are adult men and women who are full-time members of the work force while training through work and study to become even more proficient craftsworkers. As apprentices, they are among a select group of workers. To be chosen for apprenticeship, applicants must be able physically to perform the work of the craft or trade; must meet minimum age requirements; and

usually must satisfy the program sponsor by test, interview and records that they will profit from the training experience. For most trades and crafts, applicants must be high school graduates or must have earned high school equivalency certificates. Formal selection procedures are established by the sponsor and take into account equal opportunity provisions of federal and state law.

The program sponsor plans, administers and pays for the program. Sponsors can be individual employers, groups of employers or combinations of employers and unions. Combinations of equal numbers of employers and unions are called joint labor management apprenticeship committees. The term often is shortened to Joint Apprenticeship Committee (JAC) or Joint Apprenticeship and Training Committee (JATC). The latter term, JATC, applies if the committee administers a journeyman training program to upgrade craftwork skills in addition to directing an apprenticeship program.

The sponsor sets policy concerning the conduct of the program. Jurisdiction includes selecting and indenturing apprentices, supervising training, establishing training curriculum and certifying apprentices as journeymen upon completion of the program.

Apprentices, local apprenticeship committees and/or corporate directors of training are not the only entities involved with an apprenticeship program. Other involved groups and organizations include the Bureau of Apprenticeship and Training (BAT) of the U.S. Department of Labor, the Federal Committee on Apprenticeship (FCA), the State and Territorial Apprenticeship Agencies (SAC) and the National Joint Apprenticeship and Training Committees.

The federal role, as authorized by the National Apprenticeship Act of 1937, is to promote labor standards that safeguard the welfare of apprenticeships and to guide, improve and assist apprenticeship. BAT maintains a field office in every state and works with employers, unions and state apprenticeship agencies to develop programs and devise ways to give better training. The Bureau approves and registers programs, provides technical assistance to employers on training and searches out new ways to expand apprenticeship. BAT also encourages labor and management to determine future needs for journeymen as a basis for establishing apprenticeship programs. Further, it encourages development of adequate educational facilities and programs, promotes equal opportunity in the selection and employment of apprentices, conducts or sponsors studies of the system designed to improve its efficiency, distributes information related to apprenticeship and stimulates active support of effective programs among all pertinent organizations.

The federal role is enhanced by the activity of the Federal Committee on Apprenticeship, one of the oldest public advisory committees in the federal government. The Committee is composed of 25 persons appointed by the Secretary of Labor and represents management, labor and the public. FCA advises the Secretary of Labor on concerns such as expanding apprenticeship and journeymen training in all sectors of the economy, increasing the effectiveness of equal opportunity programs, promoting labor standards to protect apprentices, improving relations and coordination with other training systems, identifying research needs and strengthening cooperative relationships with state apprenticeship and training agencies.

State and territorial apprenticeship agencies have been established in 32 states and territories. Ideally, each receives policy guidance from an apprenticeship council composed of employer, labor and public representatives. Councils devise and oversee procedures for recognizing apprenticeship programs in the states. A number of SACs have staff to help employers and unions develop, expand and improve apprenticeship programs. Their work is carried on in cooperation with BAT. Each uses the BAT standards as the minimums for establishing programs but may add other state requirements in addition to the BAT specifications.

National Joint Apprenticeship and Training Committees operate in a number of trades. They are composed of representatives of national employer associations and international labor organizations. These committees develop standards for their trades that serve as guidelines for local apprenticeship programs. Also, the committees encourage local affiliates to develop and conduct programs and provide them with information on need for apprenticeship, materials, changes in technologies and training methods.

Local apprenticeship programs may or may not be registered. Registration means formal recognition of a program by a state apprenticeship agency or by the Federal Bureau of Apprenticeship and Training. Programs can be registered upon request of the sponsors when certain basic criteria are met. The benefits of registration include:

1. Assurance of a quality standardized training component;
2. Assurance of a progressively increasing wage scale;
3. Assurance of a specified term of training with clearly demarcated points for and a record of assessment, promotion, and increasing breadth and depth of training;
4. Assurance of non-discrimination;
5. Assurance of a probationary period without penalty;
6. Greater job opportunities and security; and
7. Certification upon completion.

2. Related Subjects Instruction

Related subjects instruction is an integral part of an apprenticeship program. It provides each apprentice with the theoretical and technical knowledge base necessary to become a successful journeyman. It also provides additional practice and useful examples of job-related skills and knowledges at work.

All registered programs include related subjects instruction. The National Apprenticeship and Training Standards require that a minimum of 144 hours per year of apprenticeship training be provided to each trainee in related and supplementary subjects. This period of time can be increased by trade and craft standards or by program sponsors if content warrants the increase. Some industries require as much as 200 to 300 hours yearly in related subjects study by apprentices.

The content of related subjects instruction, like the number of hours required, varies by trade or craft. In general the kinds of subjects taught include (a) the theory, principles and technical knowledge needed on the job; (b) auxiliary information that assists a worker to better accept and discharge his or her responsibilities; and (c) occasional manipulative skills that are important to the craft or trade but are not provided conveniently in the apprentice's on-the-job training. Frequently this means that related subjects instruction includes the principles, concepts, and information that apprentices must know and use from subject matter such as mathematics, general physical sciences, safety, basic measurement, and blueprint reading as well as the study of trade-specific materials and work processes/procedures. In addition, related subjects instruction helps to ensure that workers can communicate effectively in job-specific ways, can work effectively in organizations, and have knowledge about the apprenticeship system. However, regardless of the trade, craft or situation, the subject matter is current to job demands, practical, and directly useful in working in the craft or trade.

Related subjects instruction is an important portion of the apprenticeship training system. Overtime work is not permitted if it would interfere with related instruction attendance. More importantly, in order to be certified as a journeyman, an apprentice must attend *and* successfully complete the program of related instruction. Apprentices, while not always enthusiastic about attending in the early stages of training, are encouraged to take the instruction seriously. In the occasional instances when apprentices fail to fulfill their related subjects responsibilities, sponsors are authorized and required to take appropriate disciplinary action. Conversely, apprentice advancement in pay grade and responsibility is based in part on performance in related instruction. You, as a related subjects instructor, have an important role in both types of decisions by supplying data on which the decisions are based and by offering recommendations to the sponsor.

While some industries have created their own industry-specific, day-time, paid, related subjects instructional program, most related subjects instruction is delivered in the evening through programs that neither pay apprentices for time nor provide formal school credit. Frequently instruction is offered in conjunction with public education organizations at either secondary or postsecondary levels. The instruction is provided in a variety of settings including in typical classrooms, in shops or laboratories, in the work place, in the library, at the training facility, or in the union hall. Sometimes, particularly in rural areas, related instruction is even provided in the apprentice's home through independent study arrangements or correspondence courses of equivalent value to other courses of study.

Regardless of the instructional setting or the specific content, you must remember that related subjects instruction is critical to the successful training program. Related subjects instruction, as a segment of a work-training program, is of particular value in that it helps to equip apprentices with technical knowledge and manipulative skills, provides a background for promotion, substitutes for on-the-job training that is too

difficult or expensive, and contributes to individual self-esteem and acceptance as a competent craftsperson. In combination with on-the-job training, research findings suggest that it remains the most efficient means of providing employment training with better results than either on-the-job training by itself, related instruction by itself, or other types of training such as traditional education when addressed to preparing for apprenticeable occupations.

3. Instructing Adults: Your Role and Characteristics of Adult Learners

In order to derive the maximum benefit from the time and effort you and the apprentices in your charge invest in related instruction, you must remember several basic ideas about the nature of teaching adult learners in related subjects. First, remember that you were selected as an instructor because of your qualifications and abilities including your skills as a trades or craftsperson, your technical expertise, your leadership capabilities, your ability to communicate and your personality. You will use each of these talents in your role as a related subjects instructor to bridge the gap between trade knowledge and trade skills for apprentices.

Second, as a related subjects instructor, remember that you have legal and moral responsibilities to the sponsor and the apprentice. You have been hired by a sponsor to train a number of apprentices and you must follow the terms of that implicit contract with particular attention to providing the sponsor with attendance and progress reports for each apprentice. You also must meet the contractual requirements of time and subject matter for instruction specified in the apprentice agreement signed by the employer and the individual apprentice. In addition, in most states, you are legally responsible as a teacher for the safety and welfare of the trainees in your charge during instruction. This responsibility extends not only to classroom activities, but also to field trips and to instruction you might provide in other places such as the workplace. Of particular concern are use of proper procedures and safety devices when demonstrating uses of tools. While most programs will carry liability insurance that protects the instructor against negligence resulting in accidents, you must take reasonable precautions and give the trainees safety instruction integral with every skill taught. Further, continuous supervision must be exercised with apprentices during training.

Third, remember that groups of apprentices are made up of individuals with different needs, aspirations, backgrounds, abilities and learning styles. Do not assume that apprentices are, by reason of being adults, proficient learners. Instead, use the following characteristics that pertain to adult learners like apprentices:

- Adults need to feel ownership of knowledge and skills in order to commit the information into the individual's working repertoire.
- Adults must visualize, apply, and practice skills and knowledges.
- Adults prefer to work with materials that are explicit, concrete, and related to practical, personal experience.
- Adults tend to learn relatively less effectively in anxious and stressful situations.
- Adults usually attempt to relate new information and skills to prior learning and experience.
- Adults prefer to work with materials that are clear and offer certainty about the points under consideration.
- Adults respond positively to clear goals, expectations, feedback and reinforcement.
- Adults are not necessarily proficient learners and usually differ dramatically in abilities and prior experiences.

- Adults are more proficient in remembering visual stimuli as compared with written word stimuli.
- Adults process verbal information better than any other form of communication in order to form concepts, subject only to the effects of prior job experience.
- Adults prefer to work with relatively smaller units of material at one time.

In related subjects instruction there is a relatively small amount of time to deal with a relatively large amount of material. Be certain that the materials you use make effective use of the available time. Further, be sure that the materials have been developed for the target audience of adult apprentices, given that (a) adult learning characteristics differ somewhat from the characteristics of other learners and (b) usually the related subjects instruction period occurs at something other than an optimal time for learning.

Given the characteristics of the majority of adult learners there are strategies that you can employ to revise or develop useful instructional materials for adults. These procedures or strategies have been compiled into three groups according to the learner characteristic with which they are associated. Employ those that are applicable to your situation in order to improve instruction.

Characteristic: Need To Be Comfortable With Learning Situation

Adults prefer to learn in relatively less stressful and anxious situations. Stress often is unknowingly introduced into the learning setting through factors such as lack of clear or explicit expectations or materials of inappropriate length and difficulty. Remember, adult learners are more different as individuals than younger learners due to different life experiences.

There are strategies you can use to correct the difficulties associated with stress in the materials you use. For example, you can reduce uncertainty by writing out and discussing with learners performance objectives that express the expected outcomes of instruction. You can reduce anxiety and confusion further to the degree that you consistently provide introductory information and directions that describe what will occur during instruction in terms of time use, resources required, use of materials and equipment, sequence of activities, and evaluation.

A second strategy to reduce stress is to prepare materials so that the trainee experiences success while learning the information. If you prepare or use materials in a competency-based and/or performance-based format you will enhance greatly the probability of this type of success occurring. The materials described in this module have been written as competency-based and performance-based materials.

The most important strategy for reducing stress in using written instructional materials is to make sure that they are written at the appropriate level of difficulty for the user. On the average, adults can work effectively with 6 to 7 items of new information at any one time. Further, ability to work with information is limited by the attention span and reading level of the reader, the sheer volume of words to be read and the time it takes to commit information into one's long term memory. Given these factors, limit instructional materials to written segments of 5 to 10 typed pages per major point in the lesson. Additionally, do not exceed 6 to 7 major points in any one lesson. Usually you will be more effective if you deal with only five (5). Further, if at all possible, adapt materials such that they become self-paced materials. This allows for differences in reading ability—both speed and comprehension. As importantly, the self-paced aspect allows time for apprentices to process the information and commit it to memory. Taken together, these strategies provide adult learners with a sense of control over use of the materials. Further, the strategies reduce the possibility of feeling overwhelmed by large amounts of new materials. The materials described in this booklet conform to these specifications for assisting adults to be comfortable in learning situations.

Characteristic: Need For Ownership of Information and Skills

Adults learn best when they perceive that they own or possess individually the information and skills under consideration. This need is expressed in three primary ways. First, with written materials that teach rules, concepts and principles, adults process the information in their own words during and after reading in order to derive the meaning of the passage and in order to commit the information to memory. Second, when working with items, directions, and skills, adults actively imagine situations in which they mentally take the role of a person using or reacting to the information or skill. As they visualize the situation, behavior and consequences of action, they commit the skill or knowledge to working memory. Trial and error through practice permits more realistic and vivid information processing in this regard. Third, adults usually will attempt to deal with new information initially by trying to compare or associate the new information with prior learning.

Each of these three factors associated with the need to feel ownership of new knowledge and skills has specific implications for you as an instructor as you design or adapt instructional materials. For example, in terms of the propensity of adults to restate rules, concepts and principles in their own terms, be certain that the materials are written at a level of difficulty that matches the skills of the learner. In general, vocabulary should be geared to about the twelfth grade level for most adults. While some learners will finish quickly, most learners will be able to recognize and use the vocabulary used in the materials. This means that the vocabulary should be slightly more difficult than that used on the editorial and front pages of most major newspapers. In addition to vocabulary, check the sentence structure or the manner in which the words are organized into sentences. To the degree possible, the majority of sentences should conform to the standard form of English sentences. This means that the majority of sentences should contain a subject, usually a noun, at the beginning of the sentence together with a predicate, introduced by a verb, that immediately follows the noun. In addition, usually there will be short descriptive phrases in either the subject or predicate. Avoid materials with long sentences and compound sentences. Further, the verbs should be action verbs that describe concrete occurrences to the extent possible. Sentences of this type help to build mental images or pictures that assist in understanding information. Give particular attention to the first sentence of each paragraph. It is called the topic sentence and should express the major point in the entire paragraph. It is the one sentence that virtually every trainee will read so be sure that it registers or introduces the point you want to make.

In addition to restating rules and concepts in their own words, adults take the role or imagine themselves using new directions and skills. They consider the sequence of activity, the specific directions and the consequences of action. By developing this mental image (or actually practicing), adults can commit an entire set or sequence of information or activity to memory. As an instructor, provide adequate amounts of both examples and practice situations to permit learners to process the information and skills under consideration. Remember, adults learn best through practice and concrete examples. Practice situations and opportunities, together with examples, are highlighted in the core curriculum booklets.

Securing ownership of information and skills by comparing new information with prior learning also has implications for the design of instructional materials. Specifically, if you can provide explanations and comparisons of new and old information within the narrative, then you can assist the trainee to master the information. The more familiar the message is to the audience, the more rapidly the meaning will be perceived and the more easily it will be learned. Similarly, if you explicitly point out the differences between the new and old information you will help the learner to avoid confusion between the two ideas and aid in accurate learning. Therefore, when possible, help the learner compare new and old materials accurately and explicitly. Use older material to enhance learning since once learned it becomes part of the trainees' prior experience.

Characteristic: Need For Explicit, Concrete Information

Adults learn best when they work with explicit, concrete information. This need is expressed in the types of information and types of presentations that result in the most effective and efficient adult learning. Guidelines to help you in writing or adapting materials are as follows:

1. After presenting each major idea, ask two kinds of questions of the learner. First, ask specific factual questions about the major points of the lesson. Second, and more importantly, ask application questions that require the trainee to transfer the information and skill to a new situation in order to answer the question. Questions have the effect of forcing apprentices to consider concrete instances of the information as well as result in making the information more personal in nature.
2. Include examples and practice situations in the materials. This is the single most useful way to make the new information and skills relate to personal experience as well as to make the ideas concrete. Often you will find that apprentices can help supply the examples to use during instruction once they have read the background materials and you have discussed the information in class. In using examples, try to demonstrate the wide variety of work applications for the information under consideration. When providing practice, try to create real or simulated situations in which the trainee must apply the information or skill under consideration.
3. Present information in a combination of narrative and visual forms. Written materials are particularly useful for teaching difficult information because they can be reread as many times as necessary. In addition, information dealing with time or sequence usually is better presented in narrative form while information dealing with space usually is better presented in visual form. When both narrative and visual forms are used to explain a single concept, rule, idea or skill, the probability of effective and efficient learning is increased. When using visual presentation, diagrams and line drawings are usually most effective because they emphasize major points while eliminating distracting information.
4. When writing or adapting materials, try to include verbal and visual mediators and cues to note the major points, particularly if the materials are long or difficult to understand. Often handwritten notes in the margin are the most effective mediator. Be consistent in using cues.
5. When writing or arranging sections of the materials, order information logically and anchor each to a major idea or organizing concept. Arrangement of materials can follow any of several sequencing schemes. In general, ordering according to chronology or by reasoning from concrete examples to abstract principles are the most useful sequencing procedures use with adults. In addition, you should consider developing and using an introductory or closing summary for the materials.
6. When writing or adapting materials, develop a standard format and use it consistently throughout the materials. All learners,and especially adults, establish a learning set or pattern if materials are consistent. Once having established a set, learners are very efficient at working within the set.

The materials in the core curriculum booklets have been prepared so that they incorporate these suggestions for making materials concrete. The booklets contain practice situations, examples, questions, combinations of narrative and visual information, mediators, sequential ordering of concepts, and a standard format for presenting information. Each technique will assist an adult learner to master the material.

Figure 1 is a checklist of the major points discussed in this section on preparing written materials for adults. Use it to assess the written materials you use currently in your related subjects class.

Figure 1: Checklist of Factors to Look For in Well Written Instructional Materials

	Characteristics	Yes <-----> No
1.	Are clear concise performance objectives provided?	|_|_|_|_|_|
2.	Are complete, specific directions included?	|_|_|_|_|_|
3.	Are major points limited to no more than 6 to 7 per lesson?	|_|_|_|_|_|
4.	Is the page length per major topic 10 or less?	|_|_|_|_|_|
5.	Are the materials self-paced?	|_|_|_|_|_|
6.	Is the vocabulary about as difficult as that used in major newspapers?	|_|_|_|_|_|
7.	Do most sentences follow the standard form of English sentences?	|_|_|_|_|_|
8.	Do the topic sentences of paragraphs contain the essential information of the paragraph?	|_|_|_|_|_|
9.	Does the material provide examples that illustrate application of ideas?	|_|_|_|_|_|
10.	Does the material include ample practice opportunities for lessons?	|_|_|_|_|_|
11.	Are the materials written in a competency-based format?	|_|_|_|_|_|
12.	Do the materials compare new information to information covered previously?	|_|_|_|_|_|
13.	Do the materials include appropriate questions?	|_|_|_|_|_|
14.	Are combinations of narrative and illustrations used to teach the most important information?	|_|_|_|_|_|
15.	Is information organized around a central anchoring idea?	|_|_|_|_|_|
16.	Are learning tasks and requirements consistent throughout the materials?	|_|_|_|_|_|
17.	Is introductory and summary information included?	|_|_|_|_|_|

4. Core Curriculum Materials

Depending upon the program sponsor and the craft or trade, a wide variety of subjects and topics might be included in the related subjects instructional experience. Topics might logically include information associated with tools, measurement, science, materials, communication, blueprint reading, mathematics, labor relations, marketing and a variety of other subjects. CONSERVA, Inc. has developed a core curriculum of materials for apprentices to use during the first or second years of apprenticeship related subjects training. Nine of the booklets are about critical subject areas for apprentices, as determined by a national group of experts on apprenticeship and training. The tenth booklet is an instructor's guide and introduces the other booklets and explains how to use the materials in the instructional setting.

The materials are designed to be used with other related subjects instructional materials. They can be employed in one of two ways: (1) the materials can be used as the total instructional materials package for some trades, in subjects such as basic science, measurement, and working in organizations; or (2) they can be used as supplementary, introductory or practice materials in subjects such as basic mathematics, safety and an introduction to apprenticeship.

The booklets are written in a self-instructional, self-paced format. They can be used either in instructor supervised or independent study arrangements. ***Each booklet and each chapter is written as a distinct unit and is addressed to a single major topic.*** This means that instructors or apprentices can select individual booklets or chapters without necessarily using every booklet or every chapter within a booklet.

The booklets emphasize application of facts, concepts and skills. Material is presented by means of written information, visual illustration and applied example. The discussion for most major topics also includes an application section that requires trainees to demonstrate what they are learning. In addition, each chapter contains a section entitled Self-Test Exercises that contains questions, problems and exercises for apprentices to work through as a final application of the knowledge or skill and to show that they have mastered the materials.

The content of the core curriculum is presented on the following pages. Topics within subject areas are listed for each booklet. Remember, each module can be used independently of every other module.

A Basic Core Curriculum

- General Nature and Organization of Apprenticeship
- Related Subjects Instruction
- Instructing Adults: Your Role and Characteristics of Adult Learners
- Core Curriculum Materials

Introduction To Apprenticeship

- The Apprenticeship Training Program
- Rights and Responsibilities

Basic Measurement

- Units and Tools of Measurement
- Surface Measurement
- Volume and Weight Measurement
- Accuracy and Precision

Interpersonal Skills and Communication

- Communication Requirements and Components
- Listening
- Asking Questions

Sketching, Drawing and Blueprint Reading

- Lines, Symbols and Lettering
- Dimensions and Scale
- Projection Types
- Sketching and Drawing
- Blueprint Reading

Basic Physical Science

- Work, Power and Energy
- Mechanical Energy and Mechanics
- Heat Energy
- Electrical Energy

Working in Organizations

- The Nature of Organizations
- Work Behaviors
- Pride in Work

Basic Safety I

- Typical Accidents and Their Prevention
- Pre-job Safety Planning
- Safety Laws
- Accident Reporting

Basic Safety II

- Using Protective Devices and Clothing
- Using Tools and Equipment Safely
- Handling Materials Safely
- Using Ladders and Scaffolding Safely

Basic Mathematics

- Arithmetic Operations
- Fractions
- Formulas and Tables

Working through the booklets will require apprentices to read the text, to answer the questions, to perform the exercises and to complete the pretest and posttest instruments. They should expect to spend from two to five hours working through each booklet. The only resources they will need to complete the booklets are: (1) a copy of the booklet; (2) paper and a pencil or pen; (3) a ruler, and (4) several hours of time.

The materials are written in a self-instructional, programmed format. Trainees may work through the text, examples, and questions at their own pace and leisure. They need not complete their work in a booklet at one sitting.

Each chapter in the booklets is devoted to a single skill, competency or unit of knowledge. The general format of the chapters is similar, with the following parts:

1. A *chapter overview* containing all the necessary information trainees need to know in order to work through the chapter.

2. An *introduction* describing the knowledge or skill and the instructional objectives for the information.
3. *Principles, examples, and applications* presenting and explaining the content as well as offering apprentices practice opportunities to apply the information.
4. Additional sources of *information.*
5. A *self-test exercise* for applying the information under consideration.

Each booklet concludes with an appendix that contains the answers to the pretest, the self-test exercises from each chapter and the posttest.

5. Additional Resources

In addition to these materials, there are several other sets of materials that you might consider using within your program. Several of the more prominent sets of such materials are listed below. The list is intended to demonstrate that materials are available and is not intended as an exhaustive listing.

1. *A Core Curriculum of Related Instruction for Apprentices.*
   This series of modules was developed by the New York State Education Department and the University of the State of New York. Titles of modules include: "Introduction to Apprenticeship," "Safety," "Mathematics," "Human Relations," "Industrial and Labor Relations," "Issues in Economics," "Personal Economics and Financial Security," and "Communication." The booklets are instructor guides to these topics. Each contains information on content, instructional suggestions and background information.
2. *California State Department of Education Series for Apprentices.*
   This series was prepared by the State Department of Education in conjunction with representatives from trade and industry. Materials are available for several dozen trades. Each set of materials includes a teacher's guide, an apprentice workbook, and test materials.
3. *The Curriculum and Instructional Materials Center of Stillwater, Oklahoma Series.*
   This series includes vocational education and apprenticeship materials for a variety of trades including an open-shop sector training program in construction trades developed in conjunction with the Associated General Contractors of America. Materials include teacher guides, trainee workbooks, competency tests, and guidelines.
4. *Job Safety Series.*
   This series, prepared by the Center for Occupational Research and Development, Waco, Texas, under contract to the U.S. Department of Education, is a series of self-instructional booklets. Each booklet is addressed to a different safety problem such as "material hoist safety." About fifty safety topics are addressed in the materials.

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